REMARKS

Reconsideration and withdrawal of the rejections set forth in the above-mentioned Office Action in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 1, 2, 5, 6, 14, 15, 17, 18, 25, and 26 are now pending in this application, of which Claims 1 and 14 are independent. Claims 1 and 14 have been amended herein. Claims 3 and 16 have been canceled without prejudice. Support for these amendments can be found throughout the originally-filed disclosure. Thus, Applicant submits that no new matter has been added.

As a preliminary matter, Claims 1, 2, 14, 15, 25, and 26 were rejected under 35 U.S.C. § 102(b) over Yasushi (JP 2000-246900) (referred to in the Office Action as Matsuno). Applicant has herein amended Claims 1 and 14 to incorporate the features of Claims 3 and 16. Among other reasons, as the Office Action recognized that Yasushi does not teach these features, Applicant submits that this rejection has been overcome.

All of the claims were rejected under 35 U.S.C. § 103(a) over various cited art. In particular, independent Claims 1 and 14 (taking into consideration their present inclusion of features from previously dependent claims 3 and 16) were rejected over three cited documents: Nagumo (U.S. Patent No. 6,400,349), Yasushi, and Okada et al. (U.S. Patent No. 5,886,713). Applicant respectfully submits that these references, whether taken singly or in combination, fail to teach the claimed invention.

Claims 1 and 14 are directed to an inkjet printhead and a printhead substrate, respectively, having a plurality of printing elements. In an exemplary embodiment, the printhead/substrate comprises switching elements 102 and constant current sources 103 arranged in multiple groups. The switching elements and the constant current sources are separate elements, and each comprise NMOS transistors. One of the printing elements, one of the switching elements, and one of the constant current sources are connected in series between a first power supply line 110 (higher voltage) and a second power supply line 111 (lower voltage), in an order of the printing element, the switching element, and the constant current source. In particular, the printing elements are directly connected to the higher voltage supply line and the constant current sources are directly connected to the lower voltage supply line. Further, a reference current (I_{ref}) is directly supplied to the NMOS transistor of each constant current source so as to supply the constant current in accordance with the reference current

Some benefits of Applicant's invention are described in the specification on page 15, line 18 through page 16, line 25. For example, with the above arrangement, the NMOS transistor for each constant current source can have a simpler structure because it need only have a low voltage endurance. Consequently, the size of the printhead/substrate can be smaller and an influence due to the variance between the constant current sources can be suppressed.

Nagumo discloses a driving circuit of an LED. The circuit has a constant current source transistor M1 and a switching transistor M2 as shown in Fig. 2. The constant current source transistor M1, the switching transistor M2, and the LED (LD_1) are connected in series, in

an order of the constant current source transistor M1, the switching transistor M2, and the LED from the higher voltage supply line (Vdd) to the lower voltage supply line (Ground). In particular, the constant current source transistor M1 is directly connected to the higher voltage power supply line and the LED is directly connected to the lower voltage power supply line (ground).

The arrangement of Nagumo is in direct contradiction to the claimed arrangement of the present invention, in which each of the printing elements is directly connected to the first power supply line of a higher voltage and each of the constant current sources is directly connected to the second power supply line of a lower voltage. Further, Applicant asserts that if the LED of Nagumo is replaced with the printing element in the present invention, as asserted in the Office Action, the printing element would be connected to the ground and could not be energized.

Yasushi discloses a circuit for driving electrothermal conversion elements. The NMOS transistor M2 in Yasushi operates as both a switching element and a constant current source. As a result, it is difficult to control the current to be constant because the NMOS transistor M2 is switched. In the Action, the Examiner stated that transistors M2 and M3 in Figs. 10-12 of Yasushi correspond to the constant current source in the present invention. The transistors M2 and M3, however, are switched by switching elements S1A, S2A, S1B, S2B, and the reference current (Iref) for generating the constant current is supplied via these switching elements. The transistors M2 and M3, therefore, can not stably supply the constant current.

To the contrary, according to the present invention, the switching elements and the constant current sources are separately arranged in series. Further, each constant current source is connected to one of the multiple groups and the reference current (I_{ref}) for generating the constant current is directly supplied from the current generation circuit to each constant current source. These features are important because they allow for a constant current to be supplied to the printing elements.

Okada et al. discloses a printhead in which 64 heaters are divided into 8 blocks, each block including 8 heaters. However, Okada et al. does not teach or suggest connecting each constant current source to each group in order to supply a constant current to the printing elements in each of the groups.

The Office Action asserts that it would have been obvious to group a plurality of printing elements and switching elements of Yasushi into a plurality of blocks as taught by Okada et al. in such a way that each constant current source of Yasushi is connected to one of the plurality of blocks. Applicant does not agree with this assessment and asserts that neither Okada et al. nor any of the other cited art teach or suggest (i) connecting each constant current source to one group such that each group has a constant current source and (ii) directly connecting each constant current source to the second supply power line of lower voltage.

None of the other citations of record remedy the deficiencies of the cited art noted above. Therefore, Applicant asserts that Claims 1 and 14 are patentable. Reconsideration and withdrawal of the § 102 and § 103 rejections are respectfully requested.

For the foregoing reasons, Applicant respectfully submits that the present invention is patentably defined by independent Claims 1 and 14. Consequently, the dependent claims are also patentable for the reasons noted above, and in their own right, for defining features of the present invention. Individual consideration of the dependent claims is requested.

Applicant submits that the present application is in condition for allowance. Favorable reconsideration, withdrawal of all rejections, and an early Notice of Allowability are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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